WHAT IS CLAIMED IS:

1. An asynchronous transfer mode (ATM) exchange, comprising:

(a) a next hop information adder; and

(b) a shared medium frame generator,

said next hop information adder including:

(a1) a first unit which converts an ATM cell including connection data, into a network layer packet;

(a2) a second unit which extracts a network layer next hop out of said network layer packet;

(a3) a third unit which converts said network layer next hop into associated connection data; and

(a4) a fourth unit which receives said network layer packet from said second unit and said connection data from said third unit, and converts the thus received network layer packet and connection data into an ATM cell,

said shared medium frame generator including:

(b1) a fifth unit which converts said ATM cell into a network layer packet and extracts said connection data out of said ATM cell;

(b2) a sixth unit which receives said connection data from said fifth unit and converts the thus received connection data into a shared medium address; and

(b3) a seventh unit which receives said network layer packet from said fifth unit and said shared medium address from said sixth unit, and converts the thus received network layer packet and shared medium address into a shared medium frame.

2. The asynchronous transfer mode (ATM) exchange as set forth in claim 1, wherein a relation between said network layer next hop and said connection data is defined by address resolution protocol (ARP).

3. The asynchronous transfer mode (ATM) exchange as set forth in claim 1, wherein a relation between said connection data and said shared medium address is defined by address resolution protocol (ARP).

4. The asynchronous transfer mode (ATM) exchange as set forth in claim 1, wherein said third unit converts said network layer next hop said associated connection data in accordance with a predetermined rule.

5. The asynchronous transfer mode (ATM) exchange as set forth in claim 1, wherein a communication between said third unit and said sixth unit is made through an internal connection identifier.

6. An asynchronous transfer mode (ATM) exchange comprising:

(a) an asynchronous transfer mode (ATM) switch;

(b) a server card receiving an ATM cell including connection data, from said asynchronous transfer (ATM) mode;

(c) an Ethernet line card receiving an ATM cell including connection data, from said asynchronous transfer (ATM) mode, and connecting to an Ethernet terminal directly or through an Ethernet router; and

(d) an asynchronous transfer mode line card receiving an ATM cell from said asynchronous transfer (ATM) mode, and connecting to an asynchronous transfer mode terminal directly or through an asynchronous transfer mode router,

said server card including:

(b1) a first unit which converts said ATM cell into a network layer packet;

(b2) a second unit which extracts a network layer next hop out of said network layer packet;

(b3) a third unit which converts said network layer next hop into associated connection data; and

(b4) a fourth unit which receives said network layer packet from said second

unit and said connection data from said third unit, and converts the thus received network layer packet and connection data into an ATM cell,

said Ethernet line card including:

(c1) a fifth unit which converts said ATM cell into a network layer packet and extracts said connection data out of said ATM cell;

(c2) a sixth unit which receives said connection data from said fifth unit and converts the thus received connection data into a shared medium address, and

(c3) a seventh unit which receives said network layer packet from said fifth unit and said shared medium address from said sixth unit, and converts the thus received network layer packet and shared medium address into a shared medium frame.

7. The asynchronous transfer mode (ATM) exchange as set forth in claim 6, wherein a relation between said network layer next hop and said connection data is defined by address resolution protocol (ARP).

8. The asynchronous transfer mode (ATM) exchange as set forth in claim 6, wherein a relation between said connection data and said shared medium address is defined by address resolution protocol (ARP).

9. The asynchronous transfer mode (ATM) exchange as set forth in claim 6, wherein said third unit converts said network layer next hop said associated connection data in accordance with a predetermined rule.

10. The asynchronous transfer mode (ATM) exchange as set forth in claim 6, wherein a communication between said third unit and said sixth unit is made through an internal connection identifier.

11. A method of operating an asynchronous transfer mode (ATM) exchange,

comprising the steps of:

(a) converting an ATM cell including connection data, into a network layer packet;

(b) extracting a network layer next hop out of said network layer packet;

(c) converting said network layer next hop into associated connection data;

(d) converting said network layer packet and said associated connection data into an ATM cell,

(e) converting an ATM cell into a network layer packet;

(f) extracting connection data out of said ATM cell;

(g) converting said connection data into a shared medium address, and

(h) converting said network layer packet and said shared medium address into a shared medium frame,

said steps (a) to (d) being to be carried out independently of said steps (e) to (h).

12. The method as set forth in claim 11, wherein said steps (e) and (f) are concurrently carried out.

13. The method as set forth in claim 11, further comprising the step of identifying a relation between said network layer next hop and said connection data by address resolution protocol (ARP).

14. The method as set forth in claim 11, further comprising the step of identifying a relation between said connection data and said shared medium address by address resolution protocol (ARP).

15. The method as set forth in claim 11, wherein said step (c) is carried out in accordance with a predetermined rule.

26

16. A recording medium readable by a computer, storing a program therein for causing a computer to act as an asynchronous transfer mode (ATM) exchange, said asynchronous transfer mode (ATM) exchange comprising:

(a) a next hop information adder; and

5 (b) a shared medium frame generator,

said next hop information adder including:

(a1) a first unit which converts an ATM cell including connection data, into a network layer packet;

(a2) a second unit which extracts a network layer next hop out of said 10 network layer packet;

(a3) a third unit which converts said network layer next hop into associated connection data; and

(a4) a fourth unit which receives said network layer packet from said second unit and said connection data from said third unit, and converts the thus received 15 network layer packet and connection data into an ATM cell,

said shared medium frame generator including:

(b1) a fifth unit which converts said ATM cell into a network layer packet and extracts said connection data out of said ATM cell;

(b2) a sixth unit which receives said connection data from said fifth unit and 20 converts the thus received connection data into a shared medium address, and

(b3) a seventh unit which receives said network layer packet from said fifth unit and said shared medium address from said sixth unit, and converts the thus received network layer packet and shared medium address into a shared medium frame.

25

17. The recording medium as set forth in claim 16, wherein a relation between said network layer next hop and said connection data is defined by address resolution protocol (ARP).

18. The recording medium as set forth in claim 16, wherein a relation between said connection data and said shared medium address is defined by address resolution protocol (ARP).

19. The recording medium as set forth in claim 1, wherein said third unit converts said network layer next hop said associated connection data in accordance with a predetermined rule.

20. The recording medium as set forth in claim 1, wherein a communication between said third unit and said sixth unit is made through an internal connection identifier.

21. A recording medium readable by a computer, storing a program therein for causing a computer to carry out a method of operating an asynchronous transfer mode (ATM) exchange, said method comprising the steps of:

(a) converting an ATM cell including connection data, into a network layer packet;

(b) extracting a network layer next hop out of said network layer packet;

(c) converting said network layer next hop into associated connection data;

(d) converting said network layer packet and said associated connection data into an ATM cell,

(e) converting an ATM cell into a network layer packet;

(f) extracting connection data out of said ATM cell;

(g) converting said connection data into a shared medium address, and

(h) converting said network layer packet and said shared medium address into a shared medium frame,

said steps (a) to (d) being to be carried out independently of said steps (e) to (h).

22. The recording medium as set forth in claim 21, wherein said steps (e) and (f) are concurrently carried out.

23. The recording medium as set forth in claim 21, wherein said method further includes the step of identifying a relation between said network layer next hop and said connection data by address resolution protocol (ARP).

24. The recording medium as set forth in claim 21, wherein said method further includes the step of identifying a relation between said connection data and said shared medium address by address resolution protocol (ARP).

25. The recording medium as set forth in claim 21, wherein said step (c) is carried out in accordance with a predetermined rule.